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of his subjects, when he compares the value of the probable error with the value of the maximum probability of the equality judgments. When dealing with the second of these his subjects fall into an order which is almost the exact reciprocal of their order by the value of the probable error. Other serial arrangements are made, as in Urban's Monograph, on the basis of the length of the interval of uncertainty by the method of just perceptible difference and by interpolation, the probable error of the mean of the equality judgments, and the probable error of a single equality determination. Some degree of regularity is apparent in these comparisons.

This study is extremely interesting for the reason that it shows that Urban's notions as regards the psychometric functions, and all the notions derived from that concept, are valid in another sense field than that of lifted weights. The experimental arrangement is ingenious and should be applicable in the future to many experiments in the visual field. The author's presentation of his material is very clear and concise.

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SAMUEL W. FERNBERGER.

On the Relation of the Methods of Just Perceptible Differences and Constant Stimuli. By SAMUEL W. FERNBERGER, PH. D. Psychological Review Monograph Series, XIV, No. 4, 1913. pp. 81. Price \$1.

The formal character of the two methods having been shown to be identical there remains only the problem of the variations due to the experimental procedure. Fernberger's conclusions are based on lifted weight experiments which were conducted so that the space error was eliminated and the time error was constant in the first order. Seven comparison weights were used, six of which, for the method of constant stimuli, were constant in intensity and the seventh, for the method of just perceptible difference, was variable. No information was allowed the subject in reference to the weight lifted so that there could be no anticipation as to the outcome of the judgment. In the results obtained by the method of constant stimuli the effect of practice is clearly seen. Fernberger calculated the coefficient of divergence and finds a slightly over-normal dispersion which shows that the conditions did not remain absolutely constant. Since the experimental arrangement was such that a change in the objective conditions was very unlikely we must suppose that a change in the psychophysical constitution of the subject took place. Through the course of the curves plotted for the value h , in the successive series, the author is able to conclude that the variation in the distribution of the judgments is due to the state of practice of the subject. Then he shows, by a comparison of these results with results obtained from one of his subjects in a previous investigation, that this practice effect is not due to a definite training of the sensory apparatus involved but to a more consistent concentration of the attention on the task. In the method of just perceptible difference an important element is the attitude of the subject when he knows he is going through a descending or an ascending series. The use of alternate series and their presentation simultaneously with the series for the method of constant stimuli tended to neutralize the errors due to this condition of the subject.

A comparison of the two methods is the main issue of the article. It has been shown by Urban "that the common source of both

methods is to be found in the notion of the probability of a certain judgment" and it is obvious that there is no essential difference in the individual judgments since they are given on the basis of the relation of two stimuli presented in the same way. The comparison of the methods must then be made on the basis of the results obtained, the important results for the comparison being the measures of sensitivity, that is, the upper and lower thresholds. In these values there are found the expected unsystematic variations due to limited experimental data, the variations in the results for the method of just perceptible difference being the greater since these are the less extensive. But besides these chance variations there is a constant difference in the results of the two methods. The thresholds in the method of constant stimuli are always closer together than the same values for the method of just perceptible difference. The greatest difference is found in those series where, for the method of just perceptible difference, a large number of small steps were made and the least difference in those series where a few large steps were used. The amount of variation seems to be due to the number and size of the steps and the more satisfactory series is that in which a close approximation is made to the series for the method of constant stimuli. If such a series is used the results of this study seem to indicate that any discrepancies between the results would be so small that they could be disregarded.

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